

# Document made available under the Patent Cooperation Treaty (PCT)

International application number: PCT/EP05/050620

International filing date: 11 February 2005 (11.02.2005)

Document type: Certified copy of priority document

Document details: Country/Office: US  
Number: 10/779,343  
Filing date: 12 February 2004 (12.02.2004)

Date of receipt at the International Bureau: 01 July 2005 (01.07.2005)

Remark: Priority document submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b)



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APPLICATION NUMBER: 10/779,343

FILING DATE: February 12, 2004

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(105)

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**UTILITY  
PATENT APPLICATION  
TRANSMITTAL**

(Only for new nonprovisional applications under 37 C.F.R. 1.53(b))

Attorney Docket No.	Z-0026
First Inventor	Stephane V. Odent
Title	Intelligent State Engine System
Express Mail Label No.	EV 291406216 US

**APPLICATION ELEMENTS**

See MPEP chapter 600 concerning utility patent application contents.

1. ☒ Fee Transmittal Form (e.g., PTO/SB/17)  
(Submit an original and a duplicate for fee processing)
2. ☐ Applicant claims small entity status.  
See 37 CFR 1.27.
3. ☒ Specification (Total Pages 31)  
(preferred arrangement set forth below)  
- Descriptive title of the invention  
- Cross Reference to Related Applications  
- Statement Regarding Fed sponsored R & D  
- Reference to sequence listing, a table, or a computer program listing appendix  
- Background of the invention  
- Brief Summary of the invention  
- Brief Description of the Drawings (if filed)  
- Detailed Description  
- Claim(s)  
- Abstract of the Disclosure
4. ☒ Drawing(s) (35 U.S.C.113) (Total Sheets 9)
5. Oath or Declaration (Total Sheets 2)  
a. ☒ Newly executed (original or copy)  
b. ☐ Copy from a prior application (37 CFR 1.63 (d))  
(for a continuation/divisional with Box 18 completed)  
i. ☐ **DELETION OF INVENTOR(S)**  
Signed statement attached deleting inventor(s)  
named in the prior application, see 37 CFR  
1.63(d)(2) and 1.33(b).
6. ☒ Application Data Sheet. See 37 CFR 1.76

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7. ☐ CD-ROM or CD-R in duplicate, large table or  
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**ACCOMPANYING APPLICATIONS PARTS**

9. ☒ Assignment Papers (cover sheet & document(s))
10. ☐ 37 C.F.R. 3.73(b) Statement ☒ Power of  
(when there is an assignee) Attorney
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(if foreign priority is claimed)
16. ☐ Nonpublication Request under 35 U.S.C. 122  
(b)(2)(B)(i). Applicant must attach form PTO/SB/35  
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18. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in a preliminary amendment, or in an Application Data Sheet under 37 CFR 1.76:

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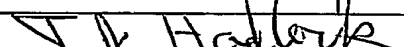
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1                                   **INTELLIGENT STATE ENGINE SYSTEM**

2  
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15  
16                                   II.     **FIELD OF THE INVENTION**

17  
18    The invention relates to an Intelligent State Engine which comprises a method  
19    and system for dynamically managing the behavior of business objects in a  
20    computer system that can be modeled with a state diagram in a non-  
21    deterministic, asynchronous and distributed event driven network  
22    environment.

23  
24                                   III.    **BACKGROUND OF THE INVENTION**

25  
26    A business process is usually described as a sequence of steps and actions,  
27    with a clear start and an end. The output of one step provides the input for  
28    the next step. Different methods have been developed to model business  
29    processes and software tools have been developed to support the information  
30    flows related to business processes. While traditionally, enterprise  
31    applications were developed to support the actions taken and information  
32    processed with a particular step in the process, it is only recently that methods  
33    and tools have been developed to support the whole process and the

1 exchange of information between different enterprise applications (example:  
2 transfer of information from the ordering system, to the billing system and  
3 subsequently to the accounting system). More specifically, workflow systems  
4 allow to model graphically the different steps in the process and to connect  
5 the output of one step with the input of the next step in the process. These  
6 tools usually allow software coding to implement business logic and do data  
7 manipulations.

8  
9 The inconvenience with workflow systems is that the process flow has always  
10 to go through a path connecting subsequent steps to reach the end of the  
11 process in a deterministic way. Each step in the process is not aware of the  
12 whole process; it receives input from its predecessor, does some processing  
13 and provides input to its successor. In the real world, processes do not always  
14 work that way and workflows are not always the most natural way to represent  
15 business interactions between individuals, organizations and systems.

16  
17 The aim of business processes is to manipulate or transform a business  
18 object (like an order, a shipment, a parcel or any business transaction) that is  
19 handed over between different individuals, locations, organizations or systems  
20 until completion of the transaction. The business objects can be physical (e.g.  
21 a parcel) or electronic (e.g. an electronic message). The behavior of such an  
22 object can be modeled with a state diagram: during its lifecycle, the object will  
23 go through different states. Actions are linked to a particular state of the  
24 object. As soon as an object arrives in a certain state, appropriate actions  
25 can be taken.

26  
27 The challenge is to maintain the consistency between the real physical state  
28 of the object and the virtual state as maintained by the information system and  
29 take the actions linked to valid state transitions in an appropriate way. During  
30 the lifecycle of the object, different agents on remote systems will publish  
31 events on the current state of the object. Due to the nature of the distributed  
32 network like the Internet, the published events do not always arrive to the  
33 central information system, there may be delay between the moment that the

1 event was created and the moment it is received in the central system, events  
2 may arrive in the wrong order and there may be many occurrences of the  
3 same event. In other words, the generation of events is non-deterministic.  
4 Existing systems are unable to do so.

5  
6 A system is needed that provides a generic solution to cope with this  
7 complexity.

8

9 IV. SUMMARY OF THE INVENTION

10

11 The invention includes a state engine system, the system including: a CPU; a  
12 memory operatively connected to the CPU, the memory containing a program  
13 adapted to be executed by the CPU and the CPU and memory cooperatively  
14 adapted for managing a plurality of objects stored in a database, whose  
15 behavior can be modeled by means of a state diagram reacting on external  
16 events which occur in a non-deterministic order. The program contained in  
17 the memory includes a code segment embodied on a computer-readable  
18 medium configured and adapted for creating, storing and maintaining state  
19 diagram templates in a database, the database including all states available  
20 for the object, the possible state transitions, the events which cause state  
21 transitions, and the actions which occur upon state transitions: where there is  
22 at least one event causing each state transition; and where the actions which  
23 occur upon a state transition is dependent upon the event that caused the  
24 transition; a code segment embodied on a computer-readable medium  
25 configured and adapted for creating a new instance of a state diagram for  
26 each new object and maintaining its current state in the running state  
27 diagram; a code segment embodied on a computer-readable medium  
28 configured and adapted for receiving notification of an event and applying it to  
29 the relevant running state diagram; a code segment embodied on a computer-  
30 readable medium configured and adapted for causing a state transition upon  
31 receiving notification of a event; and a code segment embodied on a  
32 computer-readable medium configured and adapted for causing the  
33 occurrence of one or more pre-determined actions triggered by a state

1 transition, where one of the pre-determined actions is the initiation of a timer,  
2 where the timer is configured to cause an event to occur after a pre-  
3 determined time.  
4  
5 Another embodiment of the invention includes a state engine system, the  
6 system including: a CPU; a memory operatively connected to the CPU, the  
7 memory containing a program adapted to be executed by the CPU and the  
8 CPU and memory cooperatively adapted for managing a plurality of objects  
9 stored in a database, whose behavior can be modeled by means of a state  
10 diagram reacting on external events which occur in a non-deterministic order;  
11 a code segment embodied on a computer-readable medium configured and  
12 adapted for creating, storing and maintaining state diagram templates in a  
13 database, the database including all states available for the object, the  
14 possible state transitions, the events which cause state transitions, and the  
15 actions which occur upon state transitions: where there is at least one event  
16 causing each state transition; and where the actions which occur upon a state  
17 transition is dependent upon the event that caused the transition; a code  
18 segment embodied on a computer-readable medium configured and adapted  
19 for creating a new instance of a state diagram for each new object and  
20 maintaining its current state in the running state diagram; a code segment  
21 embodied on a computer-readable medium configured and adapted for  
22 receiving notification of an event and applying it to the relevant running state  
23 diagram; a code segment embodied on a computer-readable medium  
24 configured and adapted for causing a state transition upon receiving  
25 notification of a event; and a code segment embodied on a computer-  
26 readable medium configured and adapted for causing the occurrence of one  
27 or more pre-determined actions triggered by a state transition, where one of  
28 the pre-determined actions is the initiation of a timer, where the timer is  
29 configured to cause an event to occur after a pre-determined time; a code  
30 segment embodied on a computer-readable medium configured and adapted  
31 for immediately prior to causing the occurrence of the one or more pre-  
32 determined actions in step (g), querying whether the state of the object has

1 changed and where the state of the object has changed, canceling one or  
2 more of the pre-determined actions.

3

4 Another embodiment of the invention includes a method for operating a  
5 computer-implemented state engine for managing a plurality of objects stored  
6 in a database, whose behavior can be modeled by means of a state diagram  
7 reacting on external events which occur in a non-deterministic order, the  
8 method including: creating, storing and maintaining state diagram templates in  
9 a database, the database including all states available for the object, the  
10 possible state transitions, the events which cause state transitions, and the  
11 actions which occur upon state transitions: where there is at least one event  
12 causing each state transition; and where the actions which occur upon a state  
13 transition is dependent upon the event that caused the transition; creating a  
14 new instance of a state diagram for each new object and maintaining its  
15 current state in the running state diagram; receiving notification of an event  
16 and applying it to the relevant running state diagram; causing a state  
17 transition upon receiving notification of a event; and causing the occurrence of  
18 one or more pre-determined actions triggered by a state transition, where one  
19 of the pre-determined actions is the initiation of a timer, where the timer is  
20 configured to cause an event to occur after a pre-determined time; and  
21 immediately prior to causing the occurrence of the one or more pre-  
22 determined actions in step (g), querying whether the state of the object has  
23 changed and where the state of the object has changed, canceling one or  
24 more of the pre-determined actions.

25

26 Another embodiment of the invention includes a machine-readable program  
27 storage medium tangibly embodying sequences of instructions, the  
28 sequences of instructions for execution by at least one processing system for  
29 operating a computer-implemented state engine for managing a plurality of  
30 objects stored in a database, whose behavior can be modeled by means of a  
31 state diagram reacting on external events which occur in a non-deterministic  
32 order, sequences of instructions to perform steps for: creating, storing and  
33 maintaining state diagram templates in a database, the database including all



1 states available for the object, the possible state transitions, the events which  
2 cause state transitions, and the actions which occur upon state transitions:  
3 where there is at least one event causing each state transition; and where the  
4 actions which occur upon a state transition is dependent upon the event that  
5 caused the transition; creating a new instance of a state diagram for each new  
6 object and maintaining its current state in the running state diagram; receiving  
7 notification of an event and applying it to the relevant running state diagram;  
8 causing a state transition upon receiving notification of a event; and causing  
9 the occurrence of one or more pre-determined actions triggered by a state  
10 transition, where one of the pre-determined actions is the initiation of a timer,  
11 where the timer is configured to cause an event to occur after a pre-  
12 determined time; and immediately prior to causing the occurrence of the one  
13 or more pre-determined actions in step (g), querying whether the state of the  
14 object has changed and where the state of the object has changed, canceling  
15 one or more of the pre-determined actions.

16  
17 These and other features and advantages of the present invention will be  
18 made more apparent through a consideration of the following detailed  
19 description of a preferred embodiment of the invention. In the course of this  
20 description, frequent reference will be made to the attached drawings.

## 21 22 V. BRIEF DESCRIPTION OF THE DRAWINGS

23  
24 Figure 1 depicts in one embodiment an exemplary state diagram suitable for  
25 use in the system of the invention.

26  
27 Figure 2 depicts in one embodiment an exemplary state diagram event-state  
28 matrix used in conjunction with the state diagram depicted in Figure 1.

29  
30 Figure 3 depicts in one embodiment a schematic system diagram for the 3  
31 layers of the invention.

1 Figure 4 depicts in one embodiment an exemplary schematic entity-  
2 relationship diagram for the system of the invention.

3  
4 Figure 5 depicts in one embodiment a schematic process flow diagram for  
5 Layer 1 depicted in Figure 3.

6  
7 Figure 6 depicts in one embodiment a schematic process flow diagram for  
8 Layer 2 depicted in Figure 3.

9  
10 Figure 7 depicts in one embodiment a schematic process flow diagram for  
11 Layer 3 depicted in Figure 3.

12  
13 Figure 8 depicts in one embodiment a schematic system diagram for an  
14 exemplary deployment of the system of the invention.

15  
16 Figure 9 depicts in one embodiment an exemplary schematic work flow  
17 diagram which may be used with the invention.

18  
19 Figure 10 depicts in one embodiment a graphical user interface for the system  
20 of the invention.

21  
22 VI. DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

23  
24 A. Introduction

25  
26 The following discussion and figures include a general description of a  
27 suitable computing environment in which the invention may be implemented.  
28 While the invention will be described in the general context of a system and  
29 an application program that runs on an operating system in conjunction with  
30 general purpose computers, an internet, and web, application, and email  
31 servers and clients, those skilled in the art will recognize that the invention  
32 also may be implemented in combination with other program modules.

33 Generally, program modules include routines, programs, components, data

1 structures, etc. that performs particular tasks or implement particular abstract  
2 data types.

3

4 Moreover, those skilled in the art will appreciate that the invention may be  
5 practiced with other computer system configurations, including hand-held  
6 devices, multiprocessor systems, microprocessor-based or programmable  
7 consumer electronics, minicomputers/servers, workstations, mainframe  
8 computers, and the like.

9

10 The invention may also be practiced in distributed computing environments  
11 where tasks are performed by remote processing devices that are linked  
12 through a communications network. In a distributed computing environment,  
13 program modules may be located in both local and remote memory storage  
14 devices.

15

16 Then invention generally relates to a system for an Intelligent State Engine  
17 which comprises a method and system for dynamically managing the  
18 behavior of business objects in a computer system that can be modeled with  
19 a state diagram in a non-deterministic, asynchronous and distributed event  
20 driven network environment.

21

22 The process aspects of the invention are a series of process steps utilizing, in  
23 whole or in part, the system herein and variations thereof. As would be clear  
24 to one skilled in the art, the process steps can be embodied in part as code  
25 for a computer program for operation on a conventional programmed digital  
26 computer, such as a client and server. The program code can be embodied  
27 as a computer program on a computer-readable storage medium or as a  
28 computer data signal in a carrier wave transmitted over a network.

29

30 B. Concept

31

32 Then invention is a system and method for an intelligent state engine. An  
33 intelligent state engine of the invention, implemented in software, provides a

1 software engine for dynamically responding to events applied on relevant  
2 objects whose behavior is modeled with a state diagram. The response to any  
3 given event is non-deterministic in that the response depends on the current  
4 state of the relevant object or objects. Since the state of a relevant object  
5 may change by the time the state engine is notified of an event, this invention  
6 accounts for this possibility. Thus, where the state change of an object  
7 negates the need for a given action in response to an event or requires a  
8 different action, the invention achieves this result. It also gives the possibility  
9 to take an action (e.g., a timed workflow or "TWF") when a relevant object has  
10 expired a defined delay within a given state. A "timed workflow" in one  
11 embodiment, is a delayed action associated with a particular state and a state  
12 transition. If an object makes a state transition for which a TWF has been  
13 configured, a delayed action will be programmed with a timer. If the timer  
14 expires while the object is still in its state, the associated action will be  
15 performed. On the other hand, if the object changes state before expiration of  
16 the TWF, the action will be cancelled.

17

18 The intelligent state engine in one embodiment can be described by a matrix  
19 defining the actions to perform when an event occurs depending on the  
20 current state of the relevant object: change the current state, take appropriate  
21 actions and initiate timed workflows. An example of such a matrix and the  
22 related state diagram is represented in Figures 1 and 2, discussed below.

23

24 Referring now to the drawings, in which like numerals represent like elements  
25 throughout the several figures, aspects of the present invention and a suitable  
26 operating environment will be described.

27

28 Figure 1 depicts in one embodiment an exemplary state diagram suitable for  
29 use in the system of the invention. Figure 2 depicts in one embodiment an  
30 exemplary state diagram event-state matrix used in conjunction with the state  
31 diagram depicted in Figure 1.

1 A reading of Figure 2 shows how the state engine of Figure 1 would behave in  
2 case it misses an event. A normal flow of events could be: State A, 105, to  
3 State C, 115, with event a, 110, and then to State D, 125, with event c, 120.  
4 However, if an object is in State A, 105, but misses event a, 110, then when  
5 the state engine receives event c, 120, the object will move to State D, 125.

6  
7 The state engine can then take the same actions, actions 4 and 5 (see cell  
8 235) as if we would originate from State C (see cell 240) but also takes an  
9 additional action 6 (see cell 235). Action 6 could be, for instance, a warning  
10 message to notify that it missed event a, 110. If the relevant object later  
11 received notification of event a, 130, it will not take the same actions  
12 associated with the transition State A, 105, to State C, 115, (see cell 215) as  
13 they are not relevant in the context of State D, 125, except for action 1 (see  
14 cell 225).

15  
16 Note also in the example of Figure 1 that both event c, (155) and event d,  
17 (160) will allow a transition from State A, 105, to State D, 125, but the  
18 associated actions are different (see cells 235 and 245). Therefore we  
19 consider them to be two different transitions of the state diagram.

20  
21 An example of end use of such application is in a package delivery business.  
22 In such a business the state of a package (the relevant object) may change  
23 before the state engine receives or can react to an event. E.g., the scanning  
24 of a package in a pick-up point (or collection point) generates a "received in  
25 collection point" event which typically changes the status of the package from  
26 "in transit" to "in collection point" and triggers an action to notify the customer.  
27 However, if the reception of the scan event is delayed because of an  
28 interruption in the communications network or a synchronization failure and  
29 another event "delivered to user" is received in the mean time through another  
30 channel so that the state of the package changes to "delivered", then the state  
31 engine determines not to send such a notice upon reception of a delayed  
32 scan event. Thus, the state engine responded to the same event differently  
33 base on the state of the package. The state engine achieves this by

1 rechecking the state of the package object immediately after receiving the  
2 "received in collection point" scan event. The event "received in collection  
3 point" causing the transition from the state "in transit" to the state "in collection  
4 point" could also trigger a timed workflow to notice the customer service in  
5 case the package is not collected by the customer within four days and/or  
6 send an automatic reminder to the customer.

7  
8 [The meaning of "immediately" used herein is flexible as will be depend on the  
9 type of object and process being modeled by a particular instance of a state  
10 diagram where the time is sufficient to avoid taking actions which should be  
11 canceled due a state change at least part of the time or may be in "real time".  
12 This may be in one exemplary embodiment from about one second to about  
13 five minutes prior to causing the action. This methodology can be applied to  
14 all or a selected number of actions and state changes, especially those where  
15 state changes are likely prior to an action/event which would obviate the need  
16 for the action.]

17  
18 C. Illustrative Implementation

19  
20 The intelligent state engine of the invention, in one illustrative implementation,  
21 has three software components: (1) a message oriented middleware from  
22 where it can subscribe to events applicable to relevant objects and where it  
23 can publish relevant action messages to which other systems can subscribe;  
24 (2) a database to keep the logic of the state diagrams (comprising the relation  
25 between events, states and actions), the current state of the relevant active  
26 objects and the history of the events; and (3) a program that implements the  
27 business logic of the state engine, which comprises 3 layers.

28  
29 Figure 3 depicts in one embodiment a schematic system diagram for the  
30 3 layers of the invention. Layer 1, 310, is an event translator; it subscribes to  
31 external events/messages, 305, translates and publishes the event/standard  
32 messages, 325, which can be interpreted as events to be applied on relevant  
33 objects to which Layer 2, 315, will subscribe. Layer 2 is the state engine, 100,

1 in itself; it subscribes to messages, 325, published by Layer 1 and publishes  
2 action messages, 327, depending on the state business logic of the relevant  
3 objects and the current state. Layer 3, 320, is a dispatcher; it subscribes to  
4 action messages, 327, published by Layer 2 and translates them into specific  
5 messages, 330, to which other systems can subscribe and can handle  
6 execution of the action messages, 340, or pass to other modules/systems for  
7 execution.  
8  
9 Some actions may be delayed until a relevant object has stayed a certain time  
10 in a particular state. For such actions, Layer 2 can be viewed also as a Timed  
11 Work Flow ("TWF") engine, 326, which checks all pending delayed actions at  
12 regular intervals and will fire the relevant actions, 335, when the delay has  
13 expired. When a relevant object leaves its current state, all associated  
14 delayed actions are cancelled.  
15  
16 Figure 4 depicts in one embodiment an exemplary schematic entity-  
17 relationship diagram for an underlying database schema to implement the  
18 intelligent state engine of the invention. The table below provides further  
19 description/definition of the Figure 4, including a description of the relationship  
20 and cardinality between the entities.

Table name	Description
Object Type (405)	Definition of the relevant objects whose behavior can be described with a state diagrams and on which events are applied.
Event (410)	Definition of the events that are applied on defined relevant objects. An event is applicable to only one type of relevant object, but a relevant object may have many different events.
State Diagram Definition (420)	Definition of the state diagrams that model the behavior of the defined relevant objects. A state diagram relates to only one relevant object type, but a relevant object may have several different state diagrams.
State (435)	Definition of all possible states contained in a defined state diagram.
Transition (425)	Definition of all possible transitions in a defined state diagram. A transition is defined by its state diagram, the current state and an event. Each possible event triggering the transition between two states in a state diagram has a different transition. This offers the possibility to take different actions depending on the type or origin of event.
Action (415)	Definition of the actions linked to a transition. Each transition may have different actions and actions can be linked to different transitions.
Timed Workflow (440)	Definition of the timed workflow or delayed actions linked to a transition. Each transition may have different timed workflows and timed workflows can be linked to different transitions.
Running State Diagram (430)	Instances of running state diagrams modeling the behavior of a real relevant object, with its current state.
Event History (445)	History of all events or messages to which the layer 2 is subscribed.
State History (450)	History of the new states that were triggered linked to their associated running state diagram and event.
Action History (460)	History of the action messages that were published linked to their associated running state diagram and event.
Timed Workflow History (455)	History of the timed workflow messages that were published linked to their associated running state diagram and event.



1 The detailed logic in Layers 1, 2 and 3 is described respectively in Figures 5,  
2 6, and 7. Figure 5 depicts in one embodiment a schematic process flow  
3 diagram for Layer 1, depicted generally in Figure 3. The Layer 1 Event  
4 Translator ("Layer 1"), 310, subscribes in step 505 to messages/events  
5 published by external systems. Upon receipt of a message, Layer 1 finds the  
6 ID of the relevant running object associated with the external event/message  
7 in step 510. It then finds all State Engine Events (see Figure 4, 410) relating  
8 to the external event/message (also called "Layer 1 Messages" or "State  
9 Engine Event Messages" or the like) in step 515. Then Layer 1 formats all  
10 relevant State Event Messages in step 520 and publishes them to Layer 2 in  
11 step 525.  
12  
13 Figure 6 depicts in one embodiment a schematic process flow diagram for  
14 Layer 2, the State Engine, depicted generally in Figure 3. Layer 2 subscribes  
15 to Layer 1 State Engine Event Messages in step 605. In step 610, upon  
16 receipt of a published event from Layer 1, Layer 2 checks that the message's  
17 Object ID is not null. If null, a new object is created in the Running State  
18 Diagram Table (Figure 4, 430) and its current state is set to "none" or an  
19 equivalent in step 611, and the new objects ID is passed to step 615. If not  
20 null in step 610, Layer 2, finds in step 615 the object having the object ID  
21 received. In step 620, the Layer 1 event received in step 605 is saved in the  
22 Event History Table (Figure 4, 445). Then Layer 2 retrieves all Running State  
23 Diagrams (Figure 4, 430) for the object in step 625.  
24  
25 A loop of steps 630 is then followed for each state diagram retrieved. In step  
26 635, Layer 2 tests if there is a state transition associated from the Layer 1  
27 message. If none, control is passed to step 655 to test if it is the last State  
28 Diagram. If so, the process of Layer 2 ends, 660. If there is a transition in  
29 test step 635, then, if applicable, the State Engine of Layer 2 changes the  
30 state of the object accordingly, updates the current state of the Running State  
31 Diagram, cancels any open TWF's, and saves the new state in the State  
32 History Table (Figure 4, 450).

1 In step 645, Layer 2 finds associated actions and publishes associated action  
2 messages for Layer 3. Actions are saved in the Action History Table  
3 (Figure 4, 460). Any associated TWF's are located and associated TWF's  
4 messages (Figure 3, 335) are published to Layer 3. The TWF information is  
5 saved in the TWF History Table (Figure 4, 655). In step 655, a test is made to  
6 determine if this is the Last State Diagram. If not, control returns to the top of  
7 loop 630. If not, the process terminates in step 660.

8  
9 Figure 7 depicts in one embodiment a schematic process flow diagram for  
10 Layer 3, depicted generally in Figure 3. In step 705, Layer 3 subscribes (i.e.,  
11 and receives) messages published by Layer 2. Upon receipt of a message,  
12 Layer 3 retrieves relevant data of the associated object and formats an  
13 associated external system message in step 710. Layer 3 then published the  
14 external message (Figure 3, 340) in step 715.

15  
16 D. Deployment

17  
18 Figure 8 depicts in one embodiment a schematic system diagram for an  
19 exemplary deployment of the Intelligent State Engine of the invention.  
20 External events are published by remote external agents 805 (e.g., servers or  
21 PDA), which communicate with one or more central servers that can publish  
22 messages on a middleware bus 815. This can be through any type of  
23 middleware adapter known in the art, e.g., file adapters, application adapters,  
24 database adapters, etc. Remote agents 805 communicate with the Intelligent  
25 State Engine system by way of any private or public data network 810, e.g.,  
26 the Internet or VPN, using any now known or future developed data  
27 communications protocols, e.g., http, https, FTP, various email protocols, any  
28 proprietary protocol between a device capturing events and a central server,  
29 etc.

30  
31 The Layer 1, 2 and 3 are software applications (840, 855, and 870  
32 respectively) which have access to a State Engine Database 885 and can  
33 subscribe from (845, 860 and 875 respectively) and publish (850, 865 and

1 880 respectively) messages on the middleware bus 815. The Intelligent State  
2 Engine Editor 890 can be any tool known in the art to manipulate the data  
3 records in the State Engine Database, 885.  
4

5 By way of example, the invention may be implemented to support the  
6 business of a package delivery service, i.e., a Pick-Up and Drop-Off ("PUDO")  
7 parcel delivery system. State diagrams may be implemented to follow-up  
8 packages from the time they are manifested in the warehouse, until they are  
9 delivered to end-user and vice-versa for reverse logistics. The state diagram  
10 for such a PUDO business could, e.g., feed a tracking system and trigger  
11 exceptions when packages stay too long in a collection point.  
12

13 Figure 9 depicts in one embodiment an exemplary schematic state diagram  
14 which may be used with the invention when implemented for a PUDO parcel  
15 delivery process. Events are generated by shipping files created by a  
16 shipping application when packages are manifested, hand held scanners  
17 scanning the packages in the field, status update files received from courier  
18 companies or manual corrections.  
19

20 In this embodiment of the invention the objects of interest are physical  
21 packages for delivery. Thus, the possible object states all relate to the  
22 status/location 905 of the package. The notations Normal Flow 910,  
23 Exceptional Flow 915, At Customer 920, In Transit 925, In Collection Point  
24 930, Delivered 935 and Safe Statuses 953, 965 and 996 are descriptive  
25 elements for the state diagram for this exemplary embodiment and are not  
26 intended to limit the invention. The possible states for the package are the  
27 hexagonal boxes: None 947, Customer Shipped 950, Transit Delivered 962,  
28 CP Delivered 977, CP Received 980, User Delivered 994, Customer  
29 Cancelled 956, Customer Returned 959, Transit Exception 968, Transit  
30 Refused 971, Transit Return 974, CP To be Returned 983, CP Blocked 986,  
31 CP Refused 989, User In Exception.

1 Different applications used by different actors in the logistical flow will  
2 generate events that will trigger the state transitions. The shipping application  
3 used in the warehouse will create "shipped" events via a shipping file. A  
4 scanner used in the warehouse will scan the packages when they are loaded  
5 on the van and generate "lifted" events. A courier company will scan the  
6 packages and send status update files containing "in transit" events. The  
7 courier company will also send POD ("Proof of Delivery") events to notify that  
8 a package has been delivered to destination. A scanner in the Collection Point  
9 will scan the packages upon reception by the courier and generate "Received  
10 in CP" events and also scan packages when remitted to customer and  
11 generate "delivered to customer" events. When remote devices or  
12 communication networks fail, a customer service agent could also "simulate"  
13 events on a web application to bring the state of a package in its actual state.  
14

15 Figure 10 depicts in one embodiment a graphical user interface GUI 1000,  
16 implemented as a web site, for one embodiment of the system of the  
17 invention. A customer of a PUDO parcel delivery service could access this  
18 GUI. It shows how events and status changes are reflected on the tracking web  
19 site. A user could access records via entering a Tracking number 1020 or  
20 Customer Reference 1042 (text entry fields for each not shown). The entered  
21 numbers are passed to an associated tracking database to retrieve the relevant  
22 objects and their running state diagrams associated with those numbers.  
23 Information displayed in the upper one-half of the GUI window includes  
24 information specific to the relevant object: Shipment Type 1025, Engineer  
25 Name 1030, Proof of Delivery button 1040, Order Number 1044, Collection  
26 Point 1046, and Carrier 1048.  
27

28 The lower half of GUI window shows the Events 1070 and Statuses 1075  
29 retrieved respectively from the Event History Table (see Figure 4, ref. 445) and  
30 the State History Table (see Figure 4, ref. 450). Record fields displayed include  
31 Event specific detail: Date 1050, Time 1055, Location 1060, Event description  
32 1070, Parcel Status 1075 (in case a state transition was triggered), and

1 availability Signatures 1080. Other fields and subsets of fields are within the  
2 scope of the invention.

3

4 E. Other Implementation Details

5

6 1. Terms

7

8 The detailed description contained herein is represented partly in terms of  
9 processes and symbolic representations of operations by a conventional  
10 computer and/or wired or wireless network. The processes and operations  
11 performed by the computer include the manipulation of signals by a processor  
12 and the maintenance of these signals within data packets and data structures  
13 resident in one or more media within memory storage devices. Generally, a  
14 "data structure" is an organizational scheme applied to data or an object so  
15 that specific operations can be performed upon that data or modules of data  
16 so that specific relationships are established between organized parts of the  
17 data structure.

18

19 A "data packet" is type of data structure having one or more related fields,  
20 which are collectively defined as a unit of information transmitted from one  
21 device or program module to another. Thus, the symbolic representations of  
22 operations are the means used by those skilled in the art of computer  
23 programming and computer construction to most effectively convey teachings  
24 and discoveries to others skilled in the art.

25

26 For the purposes of this discussion, a process is generally conceived to be a  
27 sequence of computer-executed steps leading to a desired result. These  
28 steps generally require physical manipulations of physical quantities. Usually,  
29 though not necessarily, these quantities take the form of electrical, magnetic,  
30 or optical signals capable of being stored, transferred, combined, compared,  
31 or otherwise manipulated. It is conventional for those skilled in the art to refer  
32 to representations of these signals as bits, bytes, words, information, data,  
33 packets, nodes, numbers, points, entries, objects, images, files or the like. It

1 should be kept in mind, however, that these and similar terms are associated  
2 with appropriate physical quantities for computer operations, and that these  
3 terms are merely conventional labels applied to physical quantities that exist  
4 within and during operation of the computer.  
5

6 It should be understood that manipulations within the computer are often  
7 referred to in terms such as issuing, sending, altering, adding, disabling,  
8 determining, comparing, reporting, and the like, which are often associated  
9 with manual operations performed by a human operator. The operations  
10 described herein are machine operations performed in conjunction with  
11 various inputs provided by a human operator or user that interacts with the  
12 computer.  
13

## 14 2. Hardware 15

16 It should be understood that the programs, processes, methods, etc.  
17 described herein are not related or limited to any particular computer or  
18 apparatus, nor are they related or limited to any particular communication  
19 architecture, other than as described. Rather, various types of general  
20 purpose machines, sensors, transmitters, receivers, transceivers, and network  
21 physical layers may be used with any program modules and any other  
22 aspects of the invention constructed in accordance with the teachings  
23 described herein. Similarly, it may prove advantageous to construct a  
24 specialized apparatus to perform the method steps described herein by way  
25 of dedicated computer systems in a specific network architecture with hard-  
26 wired logic or programs stored in nonvolatile memory, such as read-only  
27 memory.  
28

## 29 3. Program 30

31 In the preferred embodiment where any steps of the present invention are  
32 embodied in machine-executable instructions, the instructions can be used to  
33 cause a general-purpose or special-purpose processor which is programmed

1 with the instructions to perform the steps of the present invention.  
2 Alternatively, the steps of the present invention might be performed by  
3 specific hardware components that contain hardwired logic for performing the  
4 steps, or by any combination of programmed computer components and  
5 custom hardware components.  
6

7 The foregoing system may be conveniently implemented in a program or  
8 program module(s) that is based upon the diagrams and descriptions in this  
9 specification. No particular programming language has been required for  
10 carrying out the various procedures described above because it is considered  
11 that the operations, steps, and procedures described above and illustrated in  
12 the accompanying drawings are sufficiently disclosed to permit one of  
13 ordinary skill in the art to practice the present invention.

14 Moreover, there are many computers, computer languages, and operating  
15 systems which may be used in practicing the present invention and therefore  
16 no detailed computer program could be provided which would be applicable to  
17 all of these many different systems. Each user of a particular computer will be  
18 aware of the language and tools which are most useful for that user's needs  
19 and purposes.  
20

21 The invention thus can be implemented by programmers of ordinary skill in  
22 the art without undue experimentation after understanding the description  
23 herein.  
24

#### 25 4. Product 26

27 The present invention is composed of hardware and computer program  
28 products which may include a machine-readable medium having stored  
29 thereon instructions which may be used to program a computer (or other  
30 electronic devices) to perform a process according to the present invention.  
31 The machine-readable medium may include, but is not limited to, floppy  
32 diskettes, optical disks, CD-ROMs, and magneto-optical disks, ROMs, RAMs,  
33 EPROMs, EEPROMs, magnet or optical cards, or other type of

1 media/machine-readable medium suitable for storing electronic instructions.  
2 Moreover, the software portion of the present invention may also be  
3 downloaded as a computer program product, wherein the program may be  
4 transferred from a remote computer (e.g., a server) to a requesting computer  
5 (e.g., a client) by way of data signals embodied in a carrier wave or other  
6 propagation medium via a communication link (e.g., a modem or network  
7 connection).

## 8 9 5. Components

10  
11 The major components (also interchangeably called aspects, subsystems,  
12 modules, functions, services) of the system and method of the invention, and  
13 examples of advantages they provide, are described herein with reference to  
14 the figures. For figures including process/means blocks, each block,  
15 separately or in combination, is alternatively computer implemented, computer  
16 assisted, and/or human implemented. Computer implementation optionally  
17 includes one or more conventional general purpose computers having a  
18 processor, memory, storage, input devices, output devices and/or  
19 conventional networking devices, protocols, and/or conventional client-server  
20 hardware and software. Where any block or combination of blocks is  
21 computer implemented, it is done optionally by conventional means, whereby  
22 one skilled in the art of computer implementation could utilize conventional  
23 algorithms, components, and devices to implement the requirements and  
24 design of the invention provided herein. However, the invention also includes  
25 any new, unconventional implementation means.

## 26 27 6. Web Design

28  
29 Any web site aspects/implementations of the system include conventional  
30 web site development considerations known to experienced web site  
31 developers. Such considerations include content, content clearing,  
32 presentation of content, architecture, database linking, external web site  
33 linking, number of pages, overall size and storage requirements,



1 maintainability, access speed, use of graphics, choice of metatags to facilitate  
2 hits, privacy considerations, and disclaimers.

3

4 7. Other Implementations

5

6 Other embodiments of the present invention and its individual components will  
7 become readily apparent to those skilled in the art from the foregoing detailed  
8 description. As will be realized, the invention is capable of other and different  
9 embodiments, and its several details are capable of modifications in various  
10 obvious respects, all without departing from the spirit and the scope of the  
11 present invention. Accordingly, the drawings and detailed description are to  
12 be regarded as illustrative in nature and not as restrictive. It is therefore not  
13 intended that the invention be limited except as indicated by the appended  
14 claims.

VII. CLAIMS

WHAT IS CLAIMED IS:

1. A state engine system, the system comprising:

- a. a CPU;
- b. a memory operatively connected to the CPU, the memory containing a program adapted to be executed by the CPU and the CPU and memory cooperatively adapted for managing a plurality of objects stored in a database, whose behavior can be modeled by means of a state diagram reacting on external events which occur in a non-deterministic order;
- c. a code segment embodied on a computer-readable medium configured and adapted for creating, storing and maintaining state diagram templates in a database, the database comprising all states available for the object, the possible state transitions, the events which cause state transitions, and the actions which occur upon state transitions:
  - i. wherein there is at least one event causing each state transition; and
  - ii. wherein the actions which occur upon a state transition is dependent upon the event that caused the transition;
- d. a code segment embodied on a computer-readable medium configured and adapted for creating a new instance of a state diagram for each new object and maintaining its current state in the running state diagram;
- e. a code segment embodied on a computer-readable medium configured and adapted for receiving notification of an event and applying it to the relevant running state diagram;
- f. a code segment embodied on a computer-readable medium configured and adapted for causing a state transition upon receiving notification of a event; and

- 1                   9. a code segment embodied on a computer-readable medium  
2                   configured and adapted for causing the occurrence of one or  
3                   more pre-determined actions triggered by a state transition,  
4                   wherein one of the pre-determined actions is the initiation of a  
5                   timer, wherein the timer is configured to cause an event to occur  
6                   after a pre-determined time.  
7
- 8                   2. The system of claim 1, wherein the code segment for causing the  
9                   occurrence of one or more pre-determined actions triggered by a state  
10                  transition, further comprises a code segment for querying whether the  
11                  state of the object immediately prior to causing the occurrence of the  
12                  one or more pre-determined actions, and where the state of the object  
13                  has changed, canceling one or more of the pre-determined actions.  
14
- 15                  3. The system of claim 2, wherein the querying whether the state of the  
16                  object has changed occurs from about one second to about five  
17                  minutes prior to causing the occurrence of the one or more pre-  
18                  determined actions.  
19
- 20                  4. The system of claim 1, wherein the states in the state diagram  
21                  comprise a Parcel-In-Transit state and Parcel-Read-For-Pick-Up state.  
22
- 23                  5. The system of claim 1, wherein each new object represents a physical  
24                  parcel.  
25
- 26                  6. The system of claim 1, wherein an event causing a state transition  
27                  comprises delivery of a parcel to a pick-up location.  
28
- 29                  7. The system of claim 4, wherein a pre-determined action triggered by a  
30                  state transition comprises notification of customer that parcel is ready  
31                  for pick up.  
32

- 1 8. The system of claim 1, wherein the event occurring after a pre-  
2 determined time comprises the raising of a system operator flag.
- 3 9. A state engine system, the system comprising:
- 4 a. a CPU;
- 5 b. a memory operatively connected to the CPU, the memory  
6 containing a program adapted to be executed by the CPU and  
7 the CPU and memory cooperatively adapted for managing a  
8 plurality of objects stored in a database, whose behavior can be  
9 modeled by means of a state diagram reacting on external  
10 events which occur in a non-deterministic order;
- 11 c. a code segment embodied on a computer-readable medium  
12 configured and adapted for creating, storing and maintaining  
13 state diagram templates in a database, the database comprising  
14 all states available for the object, the possible state transitions,  
15 the events which cause state transitions, and the actions which  
16 occur upon state transitions:
- 17 i. wherein there is at least one event causing each state  
18 transition; and
- 19 ii. wherein the actions which occur upon a state transition is  
20 dependent upon the event that caused the transition;
- 21 d. a code segment embodied on a computer-readable medium  
22 configured and adapted for creating a new instance of a state  
23 diagram for each new object and maintaining its current state in  
24 the running state diagram;
- 25 e. a code segment embodied on a computer-readable medium  
26 configured and adapted for receiving notification of an event and  
27 applying it to the relevant running state diagram;
- 28 f. a code segment embodied on a computer-readable medium  
29 configured and adapted for causing a state transition upon  
30 receiving notification of a event; and
- 31 g. a code segment embodied on a computer-readable medium  
32 configured and adapted for causing the occurrence of one or  
33 more pre-determined actions triggered by a state transition,

- 1 wherein one of the pre-determined actions is the initiation of a  
2 timer, wherein the timer is configured to cause an event to occur  
3 after a pre-determined time;
- 4 h. a code segment embodied on a computer-readable medium  
5 configured and adapted for immediately prior to causing the  
6 occurrence of the one or more pre-determined actions in step  
7 (g), querying whether the state of the object has changed and  
8 where the state of the object has changed, canceling one or  
9 more of the pre-determined actions.
- 10
- 11 10. The system of claim 9, wherein the querying whether the state of the  
12 object has changed occurs from about one second to about five  
13 minutes prior to causing the occurrence of the one or more pre-  
14 determined actions.
- 15
- 16 11. The system of claim 9, wherein the states in the state diagram  
17 comprise a Parcel-In-Transit state and Parcel-Read-For-Pick-Up state.
- 18
- 19 12. The system of claim 9, wherein each new object represents a physical  
20 parcel.
- 21
- 22 13. The system of claim 9, wherein an event causing a state transition  
23 comprises delivery of a parcel to a pick-up location.
- 24
- 25 14. The system of claim 9, wherein a pre-determined action triggered by a  
26 state transition comprises notification of customer that parcel is ready  
27 for pick up.
- 28
- 29 15. The system of claim 9, wherein the event occurring after a pre-  
30 determined time comprises the raising of a system operator flag.
- 31
- 32 16. A method of operating a computer-implemented state engine for  
33 managing a plurality of objects stored in a database, whose behavior

1 can be modeled by means of a state diagram reacting on external  
2 events which occur in a non-deterministic order, the method  
3 comprising:

- 4 a. creating, storing and maintaining state diagram templates in a  
5 database, the database comprising all states available for the  
6 object, the possible state transitions, the events which cause  
7 state transitions, and the actions which occur upon state  
8 transitions:
  - 9 i. wherein there is at least one event causing each state  
10 transition; and
  - 11 ii. wherein the actions which occur upon a state transition is  
12 dependent upon the event that caused the transition;
- 13 b. creating a new instance of a state diagram for each new object  
14 and maintaining its current state in the running state diagram;
- 15 c. receiving notification of an event and applying it to the relevant  
16 running state diagram;
- 17 d. causing a state transition upon receiving notification of a event;
- 18 e. causing the occurrence of one or more pre-determined actions  
19 triggered by a state transition, wherein one of the pre-  
20 determined actions is the initiation of a timer, wherein the timer  
21 is configured to cause an event to occur after a pre-determined  
22 time; and
- 23 f. immediately prior to causing the occurrence of the one or more  
24 pre-determined actions in step (g), querying whether the state of  
25 the object has changed and where the state of the object has  
26 changed, canceling one or more of the pre-determined actions.

27  
28 17. The method of claim 16, wherein the step for querying whether the  
29 state of the object has changed occurs from about one second to about  
30 five minutes prior to causing the occurrence of the one or more pre-  
31 determined actions.  
32

- 1 18. The method of claim 16, wherein the states in the state diagram  
2 comprise a Parcel-In-Transit state and Parcel-Read-For-Pick-Up state.  
3 19. The method of claim 16, wherein each new object represents a  
4 physical parcel.  
5  
6 20. The method of claim 16, wherein an event causing a state transition  
7 comprises delivery of a parcel to a pick-up location.  
8  
9 21. The method of claim 16, wherein a pre-determined action triggered by  
10 a state transition comprises notification of customer that parcel is ready  
11 for pick up.  
12  
13 22. The method of claim 16, wherein the event occurring after a pre-  
14 determined time comprises the raising of a system operator flag.  
15  
16 23. A machine-readable program storage medium tangibly embodying  
17 sequences of instructions, the sequences of instructions for execution  
18 by at least one processing system for operating a computer-  
19 implemented state engine for managing a plurality of objects stored in  
20 a database, whose behavior can be modeled by means of a state  
21 diagram reacting on external events which occur in a non-deterministic  
22 order, sequences of instructions to perform steps for:  
23 a. creating, storing and maintaining state diagram templates in a  
24 database, the database comprising all states available for the  
25 object, the possible state transitions, the events which cause  
26 state transitions, and the actions which occur upon state  
27 transitions:  
28 i. wherein there is at least one event causing each state  
29 transition; and  
30 ii. wherein the actions which occur upon a state transition is  
31 dependent upon the event that caused the transition;  
32 b. creating a new instance of a state diagram for each new object  
33 and maintaining its current state in the running state diagram;

- 1 c. receiving notification of an event and applying it to the relevant  
2 running state diagram;  
3 d. causing a state transition upon receiving notification of a event;  
4 and  
5 e. causing the occurrence of one or more pre-determined actions  
6 triggered by a state transition, wherein one of the pre-  
7 determined actions is the initiation of a timer, wherein the timer  
8 is configured to cause an event to occur after a pre-determined  
9 time; and  
10 f. immediately prior to causing the occurrence of the one or more  
11 pre-determined actions in step (g), querying whether the state of  
12 the object has changed and where the state of the object has  
13 changed, canceling one or more of the pre-determined actions.  
14
- 15 24. The machine-readable program storage medium of claim 23, wherein  
16 the querying whether the state of the object has changed occurs from  
17 about one second to about five minutes prior to causing the occurrence  
18 of the one or more pre-determined actions.  
19
- 20 25. The machine-readable program storage medium of claim 23, wherein  
21 the states in the state diagram comprise a Parcel-In-Transit state and  
22 Parcel-Read-For-Pick-Up state.  
23
- 24 26. The machine-readable program storage medium of claim 23, wherein  
25 each new object represents a physical parcel.  
26
- 27 27. The machine-readable program storage medium of claim 23, wherein  
28 an event causing a state transition comprises delivery of a parcel to a  
29 pick-up location.  
30
- 31 28. The machine-readable program storage medium of claim 23, wherein a  
32 pre-determined action triggered by a state transition comprises  
33 notification of customer that parcel is ready for pick up.



- 1 29. The machine-readable program storage medium of claim 23, wherein  
2 the event occurring after a pre-determined time comprises the raising  
3 of a system operator flag.

## 1

3 The invention includes a state engine system, the system including: a CPU; a  
4 memory operatively connected to the CPU, the memory containing a program  
5 adapted to be executed by the CPU and the CPU and memory cooperatively  
6 adapted for managing a plurality of objects stored in a database, whose  
7 behavior can be modeled by means of a state diagram reacting on external  
8 events which occur in a non-deterministic order. The program contained in  
9 the memory includes a code segment embodied on a computer-readable  
0 medium configured and adapted for creating, storing and maintaining state  
1 diagram templates in a database, the database including all states available  
2 for the object, the possible state transitions, the events which cause state  
3 transitions, and the actions which occur upon state transitions: where there is  
4 at least one event causing each state transition; and where the actions which  
5 occur upon a state transition is dependent upon the event that caused the  
6 transition; a code segment embodied on a computer-readable medium  
7 configured and adapted for creating a new instance of a state diagram for  
8 each new object and maintaining its current state in the running state  
9 diagram; a code segment embodied on a computer-readable medium  
0 configured and adapted for receiving notification of an event and applying it to  
1 the relevant running state diagram; a code segment embodied on a computer-  
2 readable medium configured and adapted for causing a state transition upon  
3 receiving notification of a event; and a code segment embodied on a  
4 computer-readable medium configured and adapted for causing the  
5 occurrence of one or more pre-determined actions triggered by a state  
6 transition, where one of the pre-determined actions is the initiation of a timer,  
7 where the timer is configured to cause an event to occur after a pre-  
8 determined time.

**COMBINED DECLARATION AND POWER OF ATTORNEY**

Attorney's Docket No.

Z-0026

As a below named inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name;

I BELIEVE I AM THE ORIGINAL, FIRST, AND SOLE INVENTOR (if only one name is listed below) OR AN ORIGINAL, FIRST, AND JOINT INVENTOR (if more than one name is listed below) OF THE SUBJECT MATTER WHICH IS CLAIMED AND FOR WHICH A PATENT IS SOUGHT ON THE INVENTION

**Entitled: INTELLIGENT STATE ENGINE SYSTEM**

The specification of which: (check one)

☒ is attached hereto:☐ was filed on \_\_\_\_\_ as United States (or PCT International) Application Serial No. \_\_\_\_\_; and was amended on \_\_\_\_\_ (if applicable)

I HAVE REVIEWED AND UNDERSTAND THE CONTENTS OF THE ABOVE-IDENTIFIED SPECIFICATION, INCLUDING THE CLAIMS, AS AMENDED BY ANY AMENDMENT SPECIFICALLY REFERRED TO ABOVE:

ACKNOWLEDGE THE DUTY TO DISCLOSE INFORMATION WHICH IS MATERIAL TO THE PATENTABILITY OF THIS APPLICATION IN ACCORDANCE WITH TITLE 37, CODE OF FEDERAL REGULATIONS, Sec. 1.56, including continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application. 37 CFR Sec. 1.56 (a) states: "A patent by its very nature is affected with a public interest. The public interest is best served, and the most effective patent examination occurs when, at the time an application is being examined, the Office is aware of and evaluates the teachings of all information material to patentability. Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with this Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section. The duty to disclose information exists with respect to each pending claim until the claim is cancelled or withdrawn from consideration, or the application becomes abandoned".

I hereby claim foreign priority benefits under Title 35, United States Code Sec. 119 (a)-(d) or (f) or Sec. 365 (b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent, inventor's certificate, or international application having a filing date before that of the application on which priority is claimed:

FOREIGN APPLICATION NUMBER(S)	COUNTRY	DATE OF FILING (MM/DD/YYYY)	PRIORITY CLAIMED	CERTIFIED COPY ATTACHED
			Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
			Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>

Additional foreign applications numbers are listed on a supplemental priority data sheet (PTO/SB/12B) attached hereto:

I HEREBY APPOINT THE FOLLOWING AS OUR ATTORNEYS OR AGENTS WITH FULL POWER OF SUBSTITUTION TO PROSECUTE THIS APPLICATION AND TRANSACT ALL BUSINESS IN THE UNITED STATES PATENT AND TRADEMARK OFFICE CONNECTED HERewith:

☒ Practitioners at Customer Number:**34014**

PATENT TRADEMARK OFFICE

J.W. Ambrosius - 27,705  
C.J. Carroll - 28,831  
T.G. De Jonghe - 24,467  
S. Ellinwood - 48,495  
M.C. Fallon - 47,554  
J.P. Foley - 45,757  
T.J. Hadlock - 35,531  
F.E. Hook - 26,469

J.I. Jones - 51,368  
S.R. Kelley - 50,850  
A.W. Klaassen - 35,220  
S.G.K. Lee - 42,792  
P.L. Prater - 34,965  
M.N. Reinisch - 26,981  
S.H. Roth - 28,467  
R.J. Schulte - 35,350

R.J. Sheridan - 28,265  
L.A. Stokley - 39,845  
D.M. Tuck - 43,208  
F.C. Turner - 39,863  
W.K. Turner - 26,816  
A.H. Uzzell - 27,602  
A.S. Zavell - 28,050

☐ Practitioner(s) named below:

NAME	REGISTRATION NUMBER	NAME	REGISTRATION NUMBER

D CORRESPONDENCE TO:

**34014**


PATENT TRADEMARK OFFICE

ChevronTexaco Corporation  
Law Department  
Intellectual Property Unit  
P.O. Box 6006  
San Ramon, CA 94583-0806

PRESS ALL TELEPHONE CALLS TO: Timothy J. Hadlock at (925) 842-1884.

**COMBINED DECLARATION AND POWER OF ATTORNEY CONTINUED**Attorney's Docket No.  
Z-0026

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

FULL NAME OF SOLE OR FIRST JOINT INVENTOR, IF ANY Stephane V Odent	SIGNATURE 	DATE 05/02/04
---	---	------------------

RESIDENCE Rue de Coquiane 76 – 7850 Enghien, Belgium	CITIZENSHIP Belgian
---	------------------------

POST OFFICE ADDRESS  
(Same as above)

FULL NAME OF SECOND JOINT INVENTOR, IF ANY Dimitri Van de Putte	SIGNATURE 	DATE 5/2/4
--	---	---------------

RESIDENCE Stassartstaat 108 bus 2A, 1050 Brussels, Belgium	CITIZENSHIP Belgian
---	------------------------

POST OFFICE ADDRESS  
(Same as above)

FULL NAME OF THIRD JOINT INVENTOR, IF ANY Dominique Vernier	SIGNATURE 	DATE 5/2/04
--	---	----------------

RESIDENCE Rue Defacqz, 75 bte 29, Brussels, Belgium	CITIZENSHIP Belgian
--	------------------------

POST OFFICE ADDRESS  
(Same as above)

FULL NAME OF FOURTH JOINT INVENTOR, IF ANY	SIGNATURE	DATE
--	-----------	------

RESIDENCE	CITIZENSHIP
-----------	-------------

POST OFFICE ADDRESS  
(Same as above)

FULL NAME OF FIFTH JOINT INVENTOR, IF ANY	SIGNATURE	DATE
---	-----------	------

RESIDENCE	CITIZENSHIP
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POST OFFICE ADDRESS  
(Same as above)

FULL NAME OF SIXTH JOINT INVENTOR, IF ANY	SIGNATURE	DATE
---	-----------	------

RESIDENCE	CITIZENSHIP
-----------	-------------

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(Same as above)

Please see attached continuation page for additional inventors.

This page must be attached to a completed Page 1 of 2, Combined Declaration and Power of Attorney, before signing.

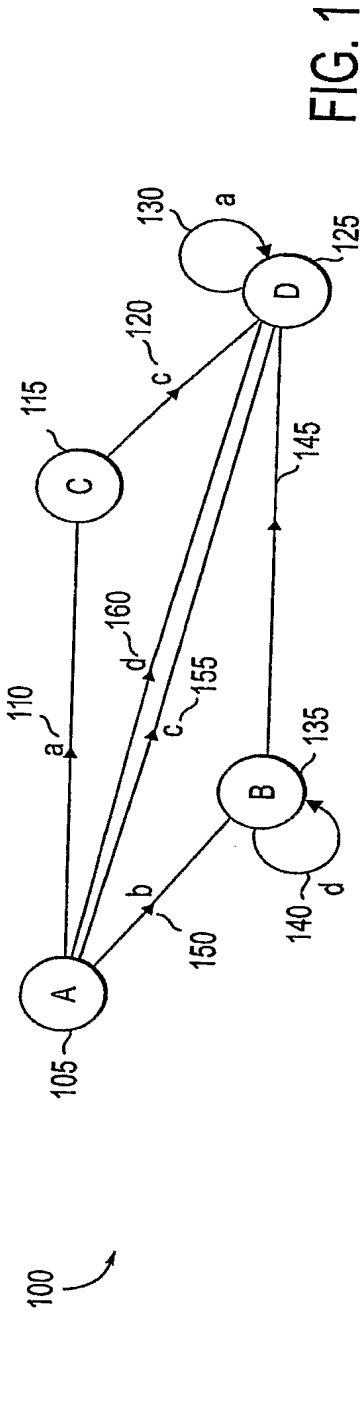


FIG. 1

Current State / Incoming Event	State A	State B	State C	State D
Event a	New State: State C Action 1 Action 2 TWF 1 <u>215</u>	Action 7 TWF 2 <u>220</u>		Action 1 <u>225</u>
Event b	New State: State B Action 3 TWF 2 <u>230</u>			
Event c	New State: State D Action 4 Action 5 Action 6 <u>235</u>		New State: State D Action 4 Action 5 <u>240</u>	
Event d	New State: State D Action 5 <u>245</u>	New State: State D Action 3 Action 5 <u>250</u>		

FIG. 2

300

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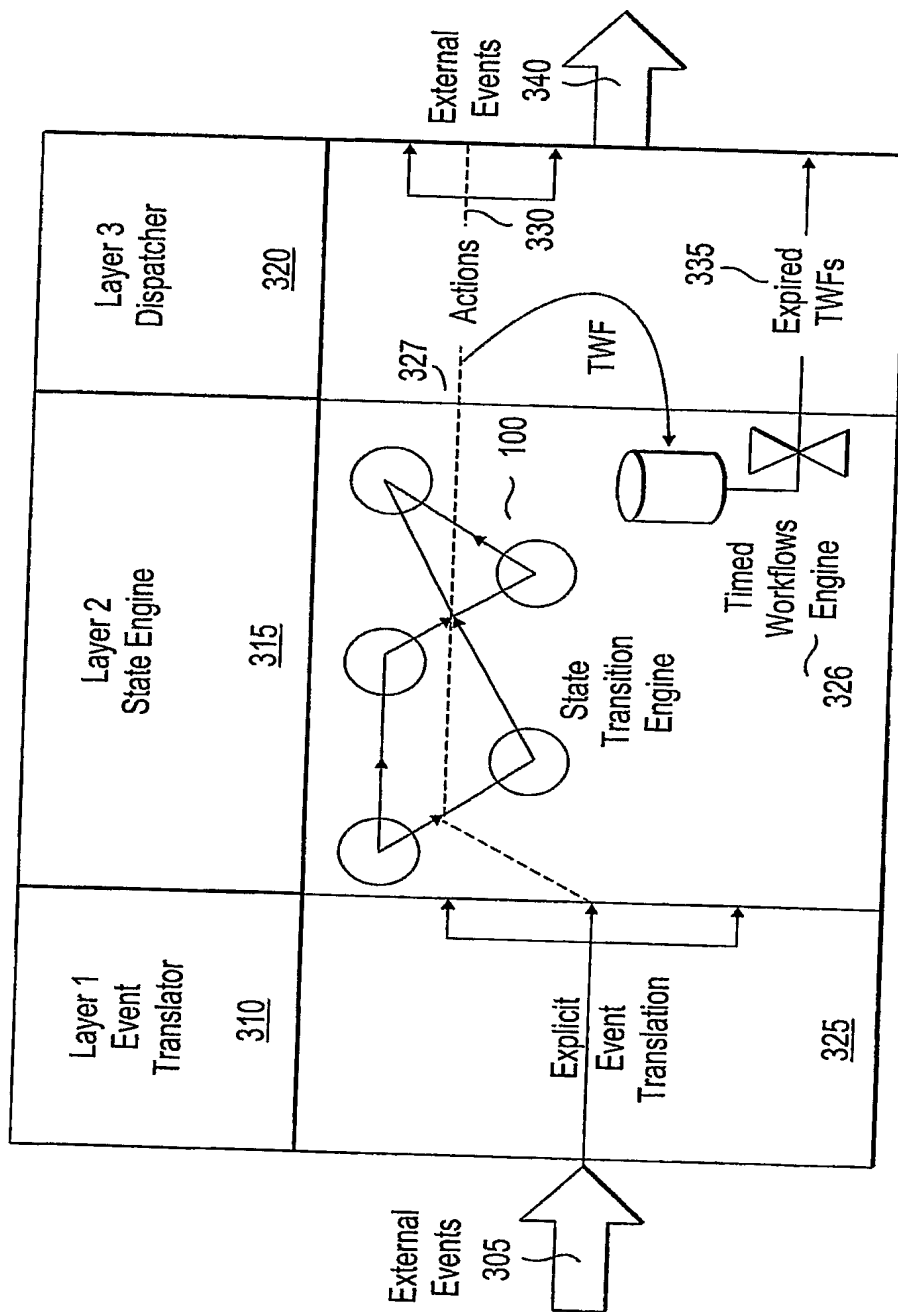


FIG. 3

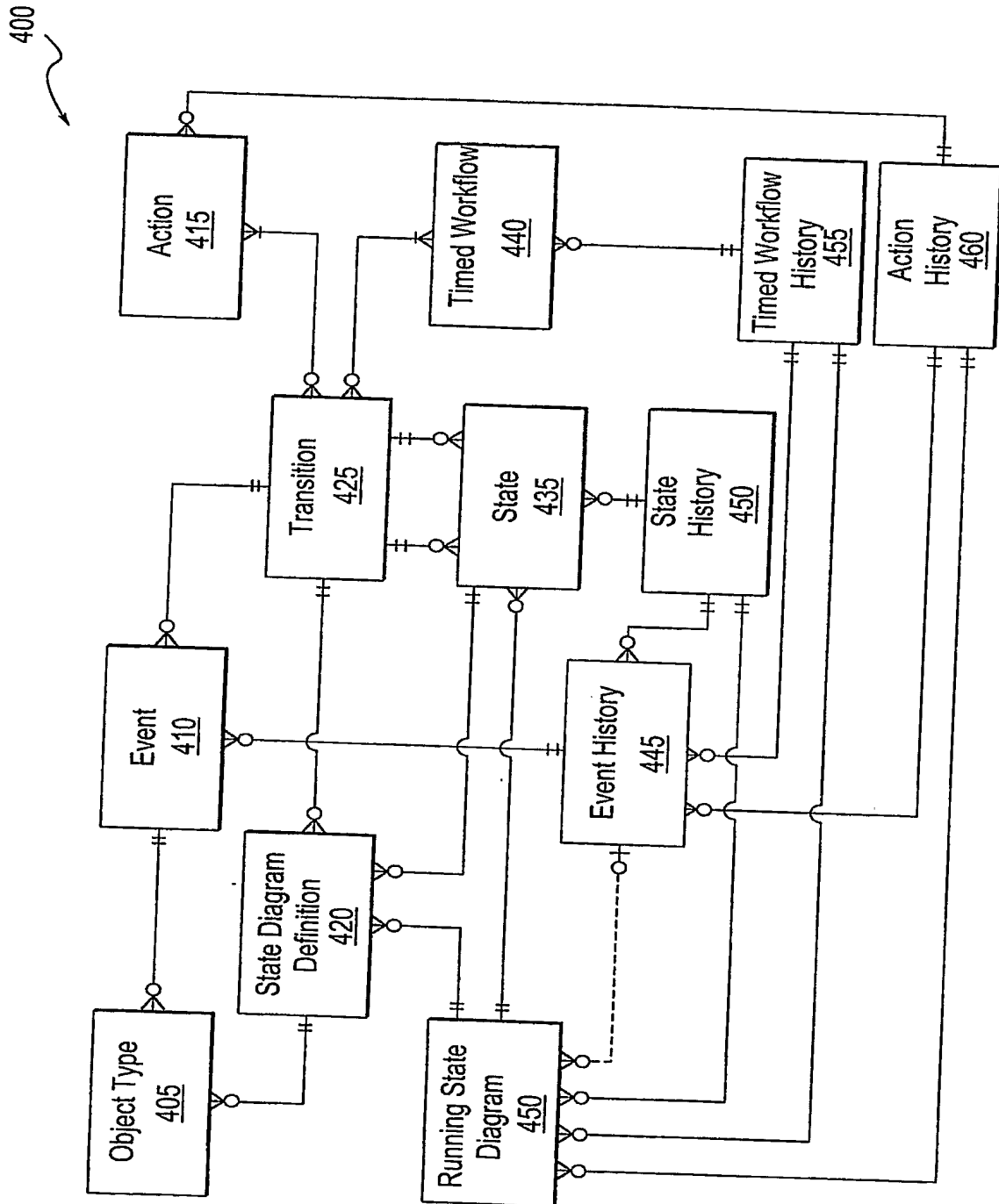


FIG. 4

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Layer 1

500

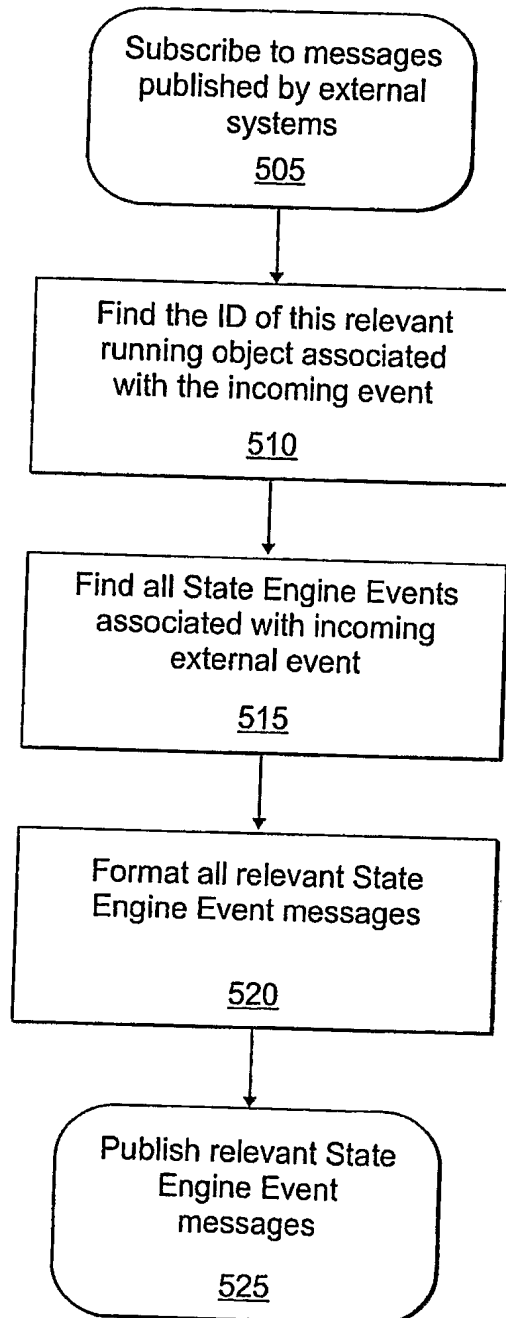


FIG. 5



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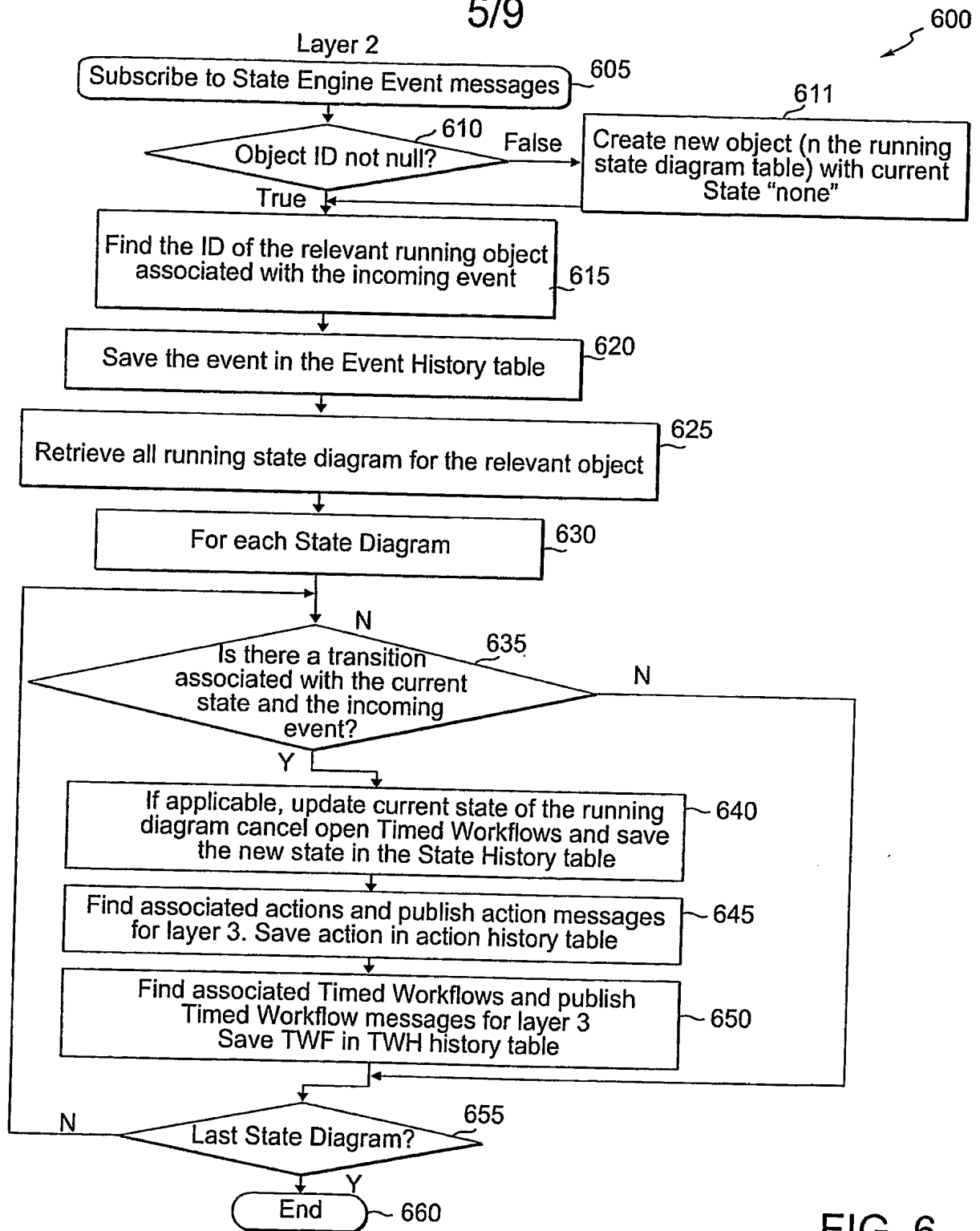


FIG. 6

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Layer 3

700

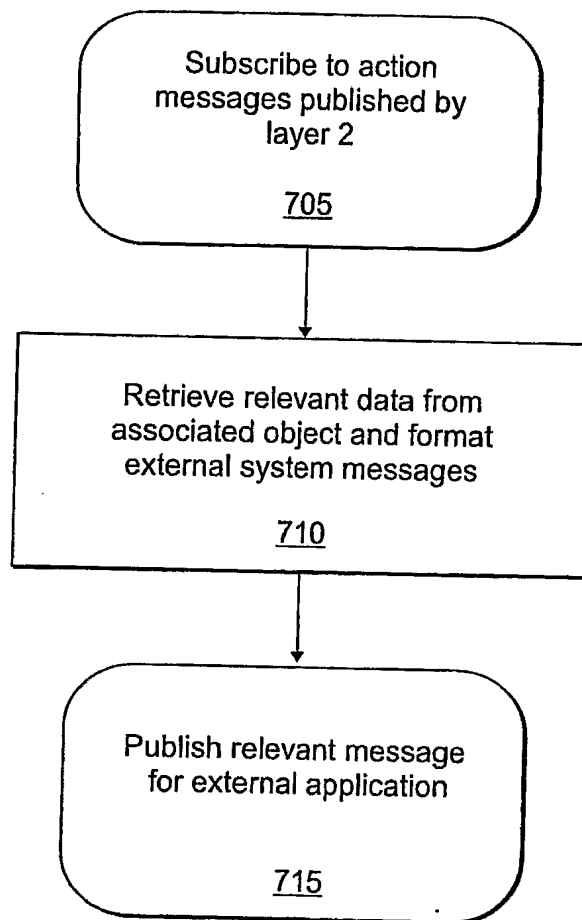


FIG. 7

800

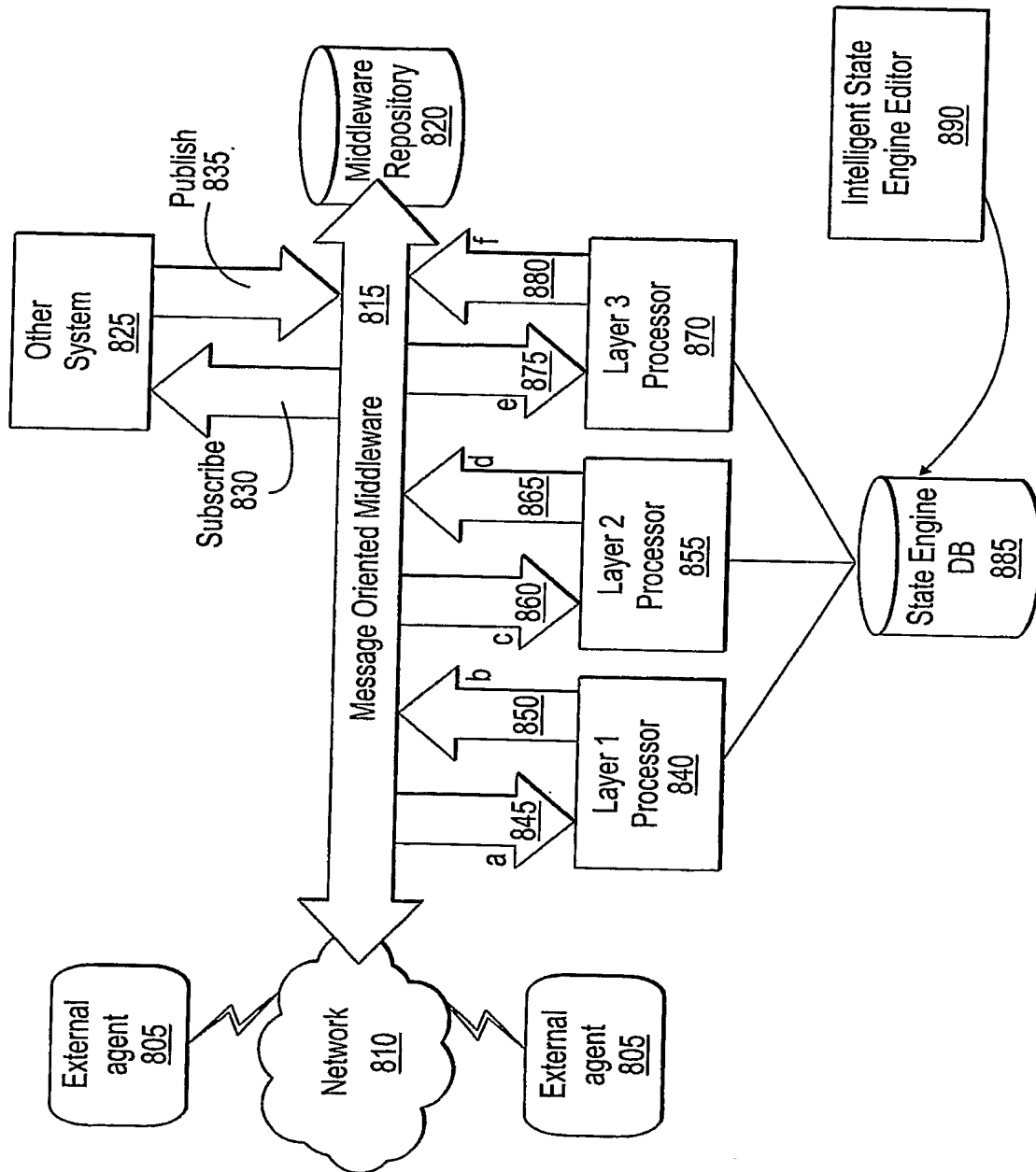
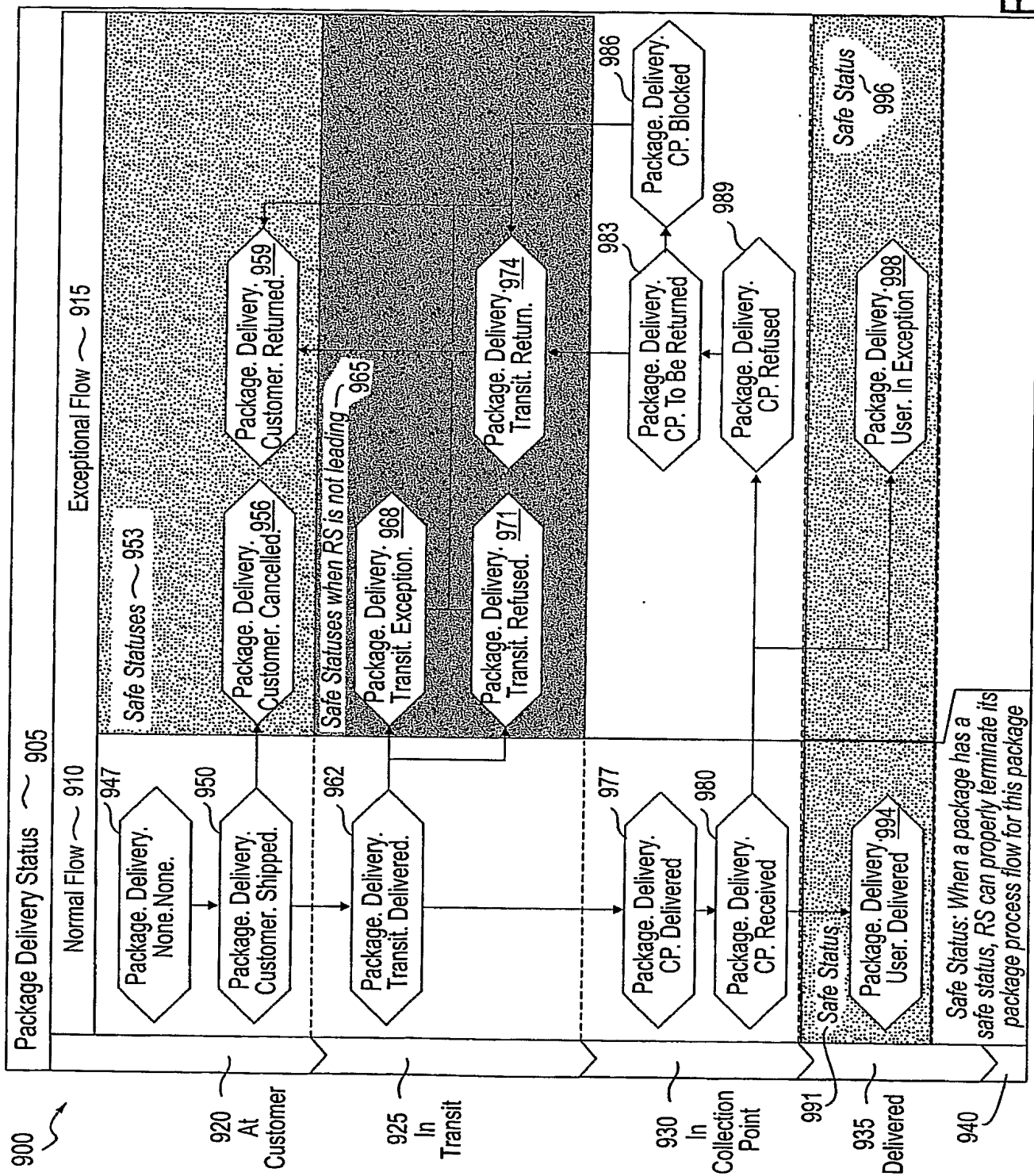


FIG. 8



9/9

1000

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⊞
RELAYSTAR

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1005

1020 ~ Tracking Number: 992045D34D4825581 1010

1025 ~ Shipment Type: Delivery

1030 ~ Engineering Name (id): C EVANS (064449) 1035

1035 ~ SPLD: Fujitsu 1040

1040 ~ Proof of Delivery Signature available: Show

1050 1055 1060

Customer Reference: ID07171190 ~ 1042

Order Number : D84440 ~ 1044

Collection Point: Belgrave Street Unit 42 Evans ~ 1046

Business Center

ML\$ 3NP- Bellhshill (UK) [6616]

Carrier: ANC Logistics ~ 1048

1070 1075 1080

Extended Tracking

Package Details

Date	Time	Location	Event	Status	Signatures
1. 7/07/2003	18:51:00--		Complete shipment record received	Delivery shipped	(NA)
2. 7/07/2003	18:56:00--		Complete shipment record received recorded by warehouse	--	(NA)
3. 7/07/2003	18:51:40--		Collected from warehouse recorded by carrier	Delivery in transit	(NA)
4. 8/07/2003	00:00:00--		Delivered to collection point recorded by carrier	Delivery received in collection point	(NA)
5. 8/07/2003	04:20:08--	Belgrave Street Unit 42 Evans Business Center ML\$ 3NP- Bellhshill (UK) [6616]	Delivered to collection point recorded by carrier	--	(NA)
6. 8/07/2003	04:15:18--	Belgrave Street Unit 42 Evans Business Center ML\$ 3NP- Bellhshill (UK) [6616]	Unexpected delivered to end user recorded by collection point	--	(NA)
7. 8/07/2003	09:50:10--	Belgrave Street Unit 42 Evans Business Center ML\$ 3NP- Bellhshill (UK) [6616]		Delivery delivered to user	(NA)

Done
Internet

FIG. 10